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PHILADELPHIA EXPERIENCE WITH COMPOUND METERS[1]

BY SETH M. VAN LOAN[2]

To procure in a single unit a meter that will register with reasonable accuracy both high and low flows and to combine such service with minimum maintenance costs, has led some water works engineers to adopt the compound meter. A quantity consumer seldom requests a smaller connection than 2-inch and for this size and larger a meter of the compound type is catalogued.

A well recognized fact is the lack of registration on metered connections with low flows, and even with the modest consumer at his home a certain amount of water is never recorded. This is relative as the size of service increases and to place a torrent type of meter on fairly large connections and expect an adequate return for benefit rendered, is as much removed from a correct choice of measuring device as may be an installation on the same line of a meter of the purely disc type. To overwork a large disc meter is a mistake and creates bad feeling between the consumer and a water works official, for the parts will surely fail, and on the torrent type a serious loss of revenue will result from unrecorded quantities. The incentive naturally arises to produce a meter combining features which will secure, as far as may be possible, the purchaser as well as the seller.

Types of services like apartment houses, office buildings, railroad stations, department stores and many industrial plants are subject to both capacity and very low demands. During the active period of the day a large percentage of the interior fixtures is in use, which demand, compared with the flow created by the running of a few scattered fixtures in use on a Sunday or a holiday or in the extreme early hours of the day, a flexible recording device. For this class of service the compound meter is a most adaptable type and records which are tabulated below reflect the advisability of such installation.

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[1] Presented at the Montreal Convention, June 24, 1920. Discussion is invited and should be sent to the Editor.

[2] General Superintendent, Bureau of Water, Philadelphia.

6-inch torrent replaced by 6-inch compound meter

Readings of torrent	*cu. ft.*	*Readings of compound*	*cu. ft.*
January 11, 1917	45,558,400	January 15, 1919	zero
December 11, 1918	47,363,200	February 17, 1920	9,429,900
Difference	1,804,800	Difference	9,429,900
Average per month	75,200	Average per month	725,377

Increase per month, 650,177 cubic feet

2-inch torrent replaced by 2-inch compound meter

Readings of torrent	*cu. ft.*	*Readings of compound*	*cu. ft.*
June 19, 1917	151,800	July 19, 1918	zero
July 10, 1918	265,400	March 5, 1920	1,083,500
Difference	113,600	Difference	1,083,500
Average per month	8,738	Average per month	54,175

Increase per month, 45,437 cubic feet

2-inch torrent replaced by 2-inch compound meter

Readings of torrent	*cu. ft.*	*Readings of compound*	*cu. ft.*
March 15, 1917	511,100	January 27, 1919	zero
October 23, 1918	515,400	February 2, 1920	154,800
Difference	4,300	Difference	154,800
Average per month	240	Average per month	12,900

Increase per month, 12,660 cubic feet

4-inch torrent replaced by 4-inch compound meter

Readings of torrent	*cu. ft.*	*Readings of compound*	*cu. ft.*
November 8, 1917	6,323,800	July 17, 1919	zero
November 21, 1918	6,522,900	March 29, 1920	295,000
Difference	199,100	Difference	295,000
Average per month	16,600	Average per month	36,875

Increase per month, 20,275 cubic feet

2-inch torrent replaced by 4-inch compound meter

Readings of torrent	*cu. ft.*	*Readings of compound*	*cu. ft.*
March 9, 1917	435,500	May 17, 1919	zero
February 19, 1918	498,900	April 22, 1920	609,000
Difference	63,400	Difference	609,000
Average per month	5,763	Average per month	55,333

Increase per month of 49,570 cubic feet

3-inch torrent replaced by 3-inch compound meter

Readings of torrent	*cu. ft.*	*Readings of compound*	*cu. ft.*
March 13, 1917	2,965,700	April 23, 1920	422,400
February 27, 1918	2,973,700	May 11, 1920	467,800
Difference	8,000	Difference	45,400
Average per month	727	Average per month	45,400

Increase per month of 44,673 cubic feet

Consideration must be given to the fact that the meters replaced had become stiff and out of repair and any new meter would show increased registration.

That some favor for the compound meter has developed among water works engineers can be proved by the fact that such meters can be furnished by a number of manufacturers and in many cases the torrent type is being replaced by compound.

Referring briefly to shop inspection and tests of compound meters, it may be assumed that a $\frac{1}{16}$ inch flow registers within 2 per cent of quantity and they have under the sensitive test proved under a $\frac{1}{64}$ inch stream. The breaking point from tests on various meters has developed on a flow equal to a $\frac{3}{8}$ inch stream and full flows are well within the 2 per cent variation usually specified.

Observation has shown two types of automatic valves in construction, i.e., a horizontal cylinder in which leather cup washers attached to a spindle operate, and a varying type presents a vertical compartment in which works a brass cylindrical piston. The former may from activity in service wear down on the contact surfaces of leather and permit leakage, while the latter, if subjected to a pump pulsation on the service, may be forced from its vertical adjustment. Some irregularity of service will result should there be a long period of small flow through the connection. This trouble is caused by freezing of the automatic valve, and the flow through the service is restricted to the capacity of the small meter. Loss of water may also result through the automatic valve due to the friction between piston and cylinders. In these notes, no intention to criticize the construction details of a compound meter is intended and the principle of control on a service approaches so close to the ideal that all should be willing to offer suggestions which may eliminate any serious defects.